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ABSTRACT

Forty-three learning disabled children referred initially between ages 7 and 14 years to a medical outpatient clinic for developmentally disabled children were evaluated and followed for a period of 5 to 7 years after which their level of academic achievement was reassessed. Initial evaluation included pediatric, neurological and developmental assessments, psychological and educational testing, and in some cases, psychiatric and language consultations. Over half the Ss received special reading help after the evaluation and/or were referred to special classes or schools designed for children with learning problems. Results indicated that Ss as a group showed very small gains in reading achievement, progressing on average approximately 4 months per year. The best predictors of final reading achievement were the reading scores in the initial evaluation. (Author/CL)

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Follow-up Study of Reading Achievement in Learning Disabled Children

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ABSTRACT

Forty-three non-retarded children with school learning problems, referred initially between ages 7 and 14 years to a medical out-patient clinic for developmentally disabled children, were evaluated and followed for a period of five to seven years after which their level of academic achievement was reassessed. Initial evaluations included pediatric, neurological and developmental assessments, psychological and educational testing and, in some cases, psychiatric and language consultations. Over half the children received special reading help after the evaluation and/or were referred to special classes or schools designed for children with learning problems.

The results of the study indicated that the children as a group showed very small gains in reading achievement over time, progressing on average approximately 4 months a year. The best predictors of final reading achievement were the reading scores at time of initial evaluation.

A high proportion of the children showed positive neurologic, psychiatric and language findings which while indicating that the children were at high risk for learning problems showed little relationship with the level of reading achievement attained by individual readers. Although the children are not representative of the general population of poor readers, they do have their counterparts in schools all over the country and require programs of instruction which employ methods other than reading and writing for the acquisition of school content.

INTRODUCTION:

At the present time, many adolescents with learning disabilities are unrecognized or are misdiagnosed by school personnel (Goodman and Mann 1976). Others, while labelled learning disabled, do not make the progress expected of them. Parents and teachers alike have expressed great disappointment and occasional anger about the reading progress of their learning disabled children, especially when many have received years of special help in reading (Kronick 1970; Evans 1972). Learning disabled students have reported feelings of sadness and depression because of their poor readings skills as well as frustration, guilt, anger, poor self image and general unworthiness (Brunner 1974; deHirsch, K. 1963; Roswell and Natchez 1977). They describe extreme concern about their future in terms of employment and general life adjustment (Kronick 1975).

There are very few studies in the literature relating to the course of reading achievement over time in learning disabled children. For the most part those which are addressed to this subject are focused on various subgroups of the population of children with reading problems, such as children from grades one through three (Rourke et al 1974), high school students approximately 2 years below grade level (Muehl and Forell 1973) and children with extensive social and emotional problems as well as difficulties in reading (Koppitz 1971).

There is a need for further investigation about the growth of reading achievement over an extended period of time in children with a wide range of learning problems. The characteristics of various samples of children

considered learning disabled must be described so that these data can be used in planning relevant programs which meet the educational, emotional and vocational needs of all learning disabled children throughout their school years.

The present study follows the course of reading achievement over a 5 to 7 year interval for a group of forty-three children referred because of school learning problems to a medical clinic for developmental disabilities. These children are part of an original group of fifty-eight children whose reading progress over a 3 to 5 year period was reported in an earlier study (Gottesman et al. 1975). The present study addresses the following questions:

1. What are the characteristics of children with learning problems severe enough to be referred to a medical facility?
2. What is the course of reading achievement over a 7 year period in these children?
3. What relationships exist among the characteristics of these children upon their admission to the clinic, their subsequent school placement, and their reading outcome?

METHODOLOGY:

Subjects:

Of an initial group of 58 subjects who had been referred to the clinic and had originally been tested between October, 1968, and June, 1970, and again between December, 1972, and May, 1973, forty-three were

available for retesting between February and August, 1975. Of the fifteen subjects who were not included in the present study, one moved out of State, nine could not be located, and five claimed they were unable to participate in further testing. These fifteen children did not differ from those included in the present study in terms of IQ, initial medical findings or in reading achievement, but they were, as a group, somewhat older.

Data Collection:

Initial Evaluation:

As part of the initial evaluation in the clinic, each child received a pediatric neurologic examination and, when deemed appropriate by the clinic team, psychiatric and speech and language evaluations as well.

A child was considered to be neurologically abnormal if at least one "hard" or two "soft" signs were present. A "hard" sign is one which localizes the damage to a specific area of the central nervous system. A "soft" sign is non-localizing, and suggestive of neuromaturational delay. Children received scores of 1 if the neurological exam was normal, 2, if soft signs were noted, and 3 if hard signs were present.

Judgments of being at risk of CNS damage were based on the evaluation of birth history and the presence of events in childhood which could result in brain injury. This information was collected from the parents at the time of admission to the clinic. No histories were available for four children. Subjects were assigned scores of 1 if a normal history was reported, 2 if from the history the child was considered "at risk," and 3 if "at grave risk."

A child was considered to be psychiatrically disturbed if he was diagnosed as: a) psychotic, or b) having some other psychiatric disturbance such as character or behavior disorders, anxiety neurosis, etc. The diagnostic criteria conformed to those outlined in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association 1968). A score of 1 signified normalcy in this area, 2, a neurotic disturbance, and 3 the presence of psychosis.

A child was identified as being speech or language impaired if he displayed: a) articulation disorders consisting of substitutions, omissions or distortions of given sounds for which he received a score of 2 and/or b) central processing disorder, i.e. disorders of a syntactic and/or semantic nature for which he was scored a 3. Again the score of 1 signified an absence of identifiable problems.

Each child was also psychologically evaluated, at which time he was given either the Wechsler Intelligence Scale for Children (WISC) or the Stanford-Binet, Form LM (SB) to measure his level of intelligence.

Reading Performance:

Every child was given the Reading Subtest of the Wide Range Achievement Test (subsequently referred to in this study as the WRAT), which measures the recognition of individual words. During the two follow-up visits, the administration of the WRAT was repeated. The Reading Subtest of the Adult Basic Learning Examination (ABLE), not used in the initial testing, was given on both follow-up visits to obtain a measure of silent reading comprehension. This test requires the selection of one word out

of three which most appropriately completes a sentence or phrase. The WRAT was selected because it can be given individuals of all ages and levels of ability. The ABLE was chosen because it is the only published reading comprehension test which begins at a first grade level with content fashioned especially for older students and adults.

Educational Placement:

After the initial work-up, educational recommendations were made for each child by a clinic team, often including his teacher, guidance counselor or principal. Several educational options were available for the children, including 1) remaining in a regular class with special attention or special remedial supplementation, 2) placement in a class designed for children with learning and behavioral problems within the public school system, or 3) placement in a special or residential school which deals with children whose particular educational and emotional needs can not be met within public school classes.

Data Analysis:

In order to obtain a profile of the characteristics of children referred to the medical clinic, standard descriptive techniques were used to analyze the initial data obtained on the sample's medical, educational, psychological, language and social status. Descriptive techniques were also used to analyze the reading performance of the sample at the three testing times. To examine the relationship of reading performance and the other initial findings, multivariate procedures were employed. A hierarchical stepwise multiple regression analysis (Cohen and Cohen 1975) was the procedure of choice since it allows for the examination of the

independent contribution of each of the variables to the dependent measures.

The characteristics of the children as determined during initial screening were selected as the independent variables, and performance on final WRAT and ABLE administrations were selected as the dependent variables. These selections were made on a post-hoc basis as the most logical means of predicting the effect of initial characteristics on subsequent reading performance. The regression equations to be reported below are those which accounted for the greatest percent of variance.

Finally, subgroups of the sample formed on the basis of their reading performance were analyzed for differences on the independent variables through the use of multiple range tests.

RESULTS:

Sample Characteristics:

The characteristics of the children in terms of age, sex, social class, IQ, medical and language findings and educational placement at the time of their initial evaluation are presented in Table 1. The forty-three children ranged in age from 7 to 14 years at the time of the initial testing and, at the time of the final testing, from age 12 to 21 years. Boys outnumbered girls a little more than 5 to 1, a ratio similar to that noted in other reports of children with school learning problems (Critchley 1964). Twenty-five children were white, 9 were black, and 8 were from an Hispanic background. Nine percent of the children came from middle class (class II

or class III) and 91% from lower class (class IV or V) backgrounds as measured by the Hollingshead and Redlich (1968) index of social position (father's occupation and education). While the mean IQ was in the low average range of intelligence, a little less than 25% of the children were functioning within the borderline range and 44% within the average range of intelligence.

It appears that there is a high incidence of positive neurological, psychiatric and language findings in this group. Forty-six percent showed a positive neurological history and 37% showed hard or soft signs upon neurological examination. Forty percent showed psychiatric disorders and 23% showed language disturbances.

While the children were all referred from regular classes initially, thirty children (70%) had been placed in special classes by the time of the second evaluation.

Thus, the children who were referred to the clinic because of school learning problems are, as a group, below average in intelligence. They show a high incidence of psychiatric, language and neurological findings, contain many more boys than girls, and are from families of a relatively low socio-economic background.

Reading Achievement Over Time:

The course of reading achievement over time can be seen in Table 2. Reading performance on the three WRATs and two ABLEs is characterized by grade equivalent scores. This group of children differs from a normal sample in that there is little gain in reading achievement in children of

increasing ages either in the initial, second or final testing. Old children show increasing retardation in reading relative to their ag Striking, also, are the small gains in reading achievement over the the average gain being approximately 4 months a year.

Relationship Between Reading and Sample Characteristics:

Table 3 presents the means, standard deviations, and inter-corr among all variables in the study. While the highly significant corr among the three administrations of the WRAT and the two administrati the ABLE were not unexpected, the strength of the correlations betwe WRAT and ABLE was somewhat surprising. Accordingly, two subsequent wise regression analyses were performed using only the dependent mea the results of which are as follows: The best predictor of Final WR achievement is found in the equation "Final WRAT = ABLE 2 + WRAT 1." equation "ABLE 2 = WRAT 2" accounted for the most variance in the fi ABLE scores. These results suggested, first, that the two measures reading may be tapping somewhat similar phenomena and, second, that best predictors of final reading achievement, defined either as decc of individual words or reading comprehension, are the results of pre reading evaluations.

Further examination of Table 3 provides additional information the relationships between the sample characteristics described earli the reading outcome of the subjects.

Performance on the Final WRAT was significantly correlated with formance on the initial and second administrations of the WRAT, both

administrations of the ABLE, initial age at screening, final testing age, full scale IQ score, and educational placement. The older the child at time of first screening, the higher his IQ, and the higher the reading scores on the earlier measures, the better his performance on the final WRAT. An inverse relationship exists between the child's educational placement and his final WRAT score. In other words, children in special classes or children who are receiving remedial attention show lower Final WRAT scores than children receiving regular class education only.

Final ABLE performance was significantly related to performance on all other reading tests, initial age at screening, age at final testing, and full scale IQ score. Again, an inverse relationship existed between the child's educational placement and his final ABLE performance.

Examining the relationships among the sample characteristics themselves, age at the time of initial evaluation and positive language findings were significantly related. Older children tended to show more language disorders than younger children. Full-Scale IQ scores were negatively related to educational placement, i.e. children with lower IQs were more likely to go to special classes.

Thus, of the sample characteristics, only intelligence, age at referral and educational placement were significantly related to final reading scores. (Social class was, however, significantly related to reading performance on the first and second WRAT administrations.)

To examine further the relationship between sample characteristics and reading performance, step-wise multiple regression analyses were

performed using the final reading administrations as the dependent measure, and sample characteristics as the independent variables.

Table 4 shows the results of the regression of sample characteristics on the Final WRAT scores. Table 5 depicts the results of the regression of sample characteristics on Final ABLE performance.

An examination of Table 4 indicates that the Final WRAT performance is best predicted by age at initial testing, type of educational placement, and judgment of risk on the basis of a neurological history. Table 5 indicates that performance on final administration of the ABLE appears to be predicted best by IQ, age at initial testing and type of educational placement.

Having examined the relationship between the various sample characteristics and the reading outcome of the group as a whole, it seemed important to investigate whether children who showed different patterns of reading achievement also showed differences in the other variables described in the study.

For the purpose of these analyses, the forty-three children were divided into 5 groups according to their scores on the WRAT, and again, according to their scores on the ABLE. The groups were as follows:

Group I: Children who started and remained low during the various testings. Low was defined as scores more than one-half standard deviation below the sample mean,

Group II: Children who started and remained average which was defined as performance on all test administrations within ± one-half standard deviation of the sample mean,

Group III: Children who started and remained high, defined as more than one-half standard deviation above the sample mean,

Group IV: Children whose scores changed up, either from low to average or from average to high, and

Group V: Children whose scores changed down, either from high to average or from average to low.

No child showed scores changing both up and down on the WRAT. Multiple range tests were performed for both the WRAT and ABLE groups. For the WRAT the five groups were examined for differences in IQ, initial age, social class, educational placement and neurological history since the multiple regression analyses indicated that these variables best predicted the final WRAT scores. Similarly for the ABLE, the groups were examined for educational placement, social class, IQ and initial age.

No significant differences among the five groups could be found on any of the variables relating to WRAT achievement. On the ABLE, the low and high groups differed significantly in IQ. Children in the high group also tended to be older at the time of initial testing than those in the average group.

SUMMARY OF FINDINGS:

Forty-three children referred to a medical out-patient clinic because of reading difficults were evaluated and followed for a period of 5 to 7 years. The results of the study indicated that:

1. The children as a group showed a higher incidence of positive neurological, psychological and language findings than in other samples of poor readers reported in the literature (Rutter et al. 1970, Kenny et al. 1972). They also showed a mean IQ falling within the low-average range of intelligence.

2. The children as a group showed very small gains in reading achievement over time. They progressed, on the average, approximately 4 months a year, the same rate of gain noted in the earlier follow-up study of these children (Gottesman et al. 1975).

3. Children in special educational placements are more likely to have lower IQs and to earn lower scores on the final WRAT and ABLE than children in regular classes.

4. In examining the relationships among the variables in the study, it was found that the best predictors of final WRAT and ABLE achievement were previous WRAT and ABLE scores. ABLE and WRAT scores over time showed extremely high correlations.

5. Excluding the initial and subsequent scores on the two measures of reading achievement, final WRAT outcome was best predicted by initial age at testing, educational placement and neurological history. Thus, on the Final WRAT the older child in a regular class placement with a negative neurological history was most likely to show the best age related reading performance. Factors relating to final ABLE outcome, again excluding the earlier reading scores, were IQ, initial age and educational placement. Again, the older child with a relatively high IQ in a regular

class will be most likely to show the best age related ABLE outcome.

6. In this group of children, other medical and psychiatric and language findings were not significantly related to reading outcome on either reading test. Interestingly enough, the correlation between the findings on the neurological history and neurological examinations were non-significant. Language disturbances occurred more frequently in older than in younger children.

7. The separation of children into sub-groups of achievers based on their reading scores over time did not provide significant insight into possible sub-group characteristics distinguishing one group from another in terms of age, IQ, neurological history and school placement.

DISCUSSION:

In discussing the implications of the study, it is important to note that the children in the study are not representative of all children with school learning problems. They are more handicapped intellectually, display a higher incidence of neurological, psychiatric and language disabilities, and show a more severe degree of reading retardation. Nevertheless, they do have counterparts within the general population for whom the implications of the findings seem applicable.

While standard medical, language and psychological evaluations help to identify children who will probably have severe and persistent reading problems, the results of these evaluations are not useful in distinguishing between the relatively better and poorer achievers.

Initial reading achievement scores are a better indicator of future achievement than a knowledge of the magnitude of medical and linguistic disabilities. Most children in the study had multiple problems as well as poor achievement, and this the medical, language and psychological evaluations confirmed.

The lack of significant relationships between the medical examinations and reading achievement suggests one of two possibilities; first, medical findings indeed have little to do with reading achievement, or second, that in order for the medical evaluations to be pedagogically meaningful, they must relate not to the fact of central nervous system damage per se but to nervous system functioning and processing (e.g., Birch 1962, 1974, Denckla 1973).

Educators have been arguing about the various components of reading for generations. Some theorize that reading is primarily a task of word recognition (Jaskak 1976) while others argue that reading involves comprehension of meaningful units of written language (Mazurkiewicz 1968). Of interest here is the extremely close relationship found between performance on the two reading measures in the study, the WRAT and ABLE. They may both be measuring similar phenomena, suggesting that the deciphering of individual words and comprehension of meaningful passages may not be two distinct skills but may relate to a single ability. From the data, however, it appears that for children whose decoding ability is below second grade level on the WRAT the comprehension of the simplest passages is negligible while with decoding ability at or above third grade

level, the context of the reading passage may facilitate the ability to figure out words.

Children placed in special classes showed a slower rate of reading achievement than children remaining in regular classes. However, children in special classes, as a group, had lower IQs and were poorer readers initially than children placed in regular classes. Their slower progress may be a function of these two factors. The findings that children in special classes for the learning disabled had a lower mean IQ than those children who remained in regular class is consistent with Shepherd's (1977) results. Shepherd pointed out that many children identified and treated by school systems as learning disabled are primarily slow learners. The guidelines for learning disabilities proposed by the U. S. Office of Education in November, 1976, state that in order for a child to be considered learning disabled, he must show a severe discrepancy between academic achievement and intellectual ability.[1]

The number of children who truly fit this definition appear to be a far smaller group than the number of children labeled as such by the school, and their inclusion in classes for the learning disabled may not only be inappropriate but detrimental to the education of the truly learning disabled.

[1] As stated in "Centerfold," November, 1976, Newsletter of the Title VI-G Network of Child Service Demonstration Centers, funded by Bureau of Education for the Handicapped, U. S. Office of Education.

In terms of reading skills, the children in this study fell steadily behind their normal peers. Although they did continue to make progress, it was a very slow rate - about four months a year. Since initial reading scores are a relatively accurate predictor of subsequent reading achievement, this suggests that school programs can utilize early assessment information for planning programs of instruction. The creation of reading materials which are age appropriate in interest and content but which are on reading levels that the children can handle would be very useful. In addition, all effort should be made to present the content of the school curriculum in ways other than through reading. Tapes, films and live demonstrations could present important content which these children miss when it is presented through the medium of reading. Programs which engage the pupils in direct manipulation of materials and equipment as described by Silberberg et al. (1969) might also enhance their learning. Continued exploration of better teaching methods for these children may lead not only to more success in the acquisition of reading skills but also to fostering greater understanding of the other subjects of the curriculum.

This study has followed the reading achievement of a selected sample of learning disabled children for a period of five to seven years. Additional research is needed about the course of reading achievement over time in a wide variety of learning disabled young people who have been exposed to various programs of educational intervention. Information of this nature will enable educators to provide far more comprehensive

and effective education for these students than is presently available.

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Table 5

Step-Wise Regression of
Sample Characteristics on Final ABLE

Source	df/res.	F ratio	% Variance Accounted For	Standard Beta
Language	1/38	.56	1.4	-.20
Psych. Exam	2/37	.62	1.6	.07
Social Class	3/36	2.23	5.6	-.26
FS IQ	4/35	6.44*	14.1	.22
Initial Age	5/34	8.95*	16.0	.18
Educ. Placement	6/33	5.65*	8.9	-.34
Age at Testing	7/32	.33	.5	.19
Neur. Hist.	8/31	.76	1.2	.13
Neur. Exam	9/30	1.04	1.6	-.13

* $p < .05$

Standardized Regression Equation:

Final ABLE = .22 FSIQ + .18 Initial Age -.34 Educational Placement

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Table 1

Characteristics of Children at Time of Initial Evaluation

Age in Years and Months	Number	Sex M	Sex F
7 to 7-11	9	7	2
8 to 8-11	9	6	3
9 to 9-11	5	4	1
10 to 10-11	9	9	0
11 to 11-11	7	6	1
12 and above	4	3	1
Total	43	35	8

Full-Scale IQ[1]	Number
70 to 79	10
80 to 89	14
90 to 99	12
100 to 109	7
$\bar{x}$ = 88.18	
s.d. = 10.24	

Neurological History[2]	Number
No risk	21
At risk	16
At grave risk	2

Neurological Examination	Number
Normal	27
Soft signs	9
Hard signs	7

Psychiatric Examination	Number
Normal	26
Neurotic	11
Psychotic	6

Language Evaluation	Number
Normal	33
Articulation Disorders	5
Central Processing Disorders	5

Educational Placement[3]	Number
Regular Class	7
Regular Class and Tutoring	6
Special Class	12
Special Class and Tutoring	18

Social Class[4]	Number
Professional Managerial (Class I)	0
White Collar (Class II)	1
Skilled Labor (Class III)	3
Semi-skilled Labor (Class IV)	25
Unskilled Labor (Class V)	14

[1] WISC or Stanford-Binet

[2] on which information was available - 39 children

[3] At time of second testing

[4] Based on Hollingshead and Redlich (1958) index of social position

Table 2

Reading Performance of Subjects[1] at Three Testings by Age at Initial Testing

Initial Age	Number	Initial Testing[2] Oct.'68-June '70	Second Testing[3] Dec. 72 -May '73		Final Testing[4] Dec.'74 to May'75	
		WRAT	WRAT	ABLE	WRAT	ABLE
7 to 7-11	9	.9	2.3	1.2	3.3	2.6
8 to 8-11	9	1.8	3.0	2.4	3.5	3.5
9 to 9-11	5	2.2	3.8	3.8	3.5	4.5
10 to 10-11	9	2,5	3.6	3.6	4.1	4.8
11 to 11-11	7	2.2	3.6	3.3	4.4	6.0
12 amd above	4	3.5	4.5	4.7	4.4	5.0
Total Group	43					
Mean		1.9	3.3	2.9	3.8	4.3
Standard Deviation		1.1	1.4	2.3	1.7	2.6

[1] Reading performance as reflected by grade equivalency scores based on norms for each measure

[2] Mean age - 9 years 7 months, standard deviation - 22 months

[3] Mean age - 13 years 1 month, standard deviation - 25 months

[4] Mean age - 15 years 3 months, standard deviation - 25 months

Table 3

Intercorrelation Matrix, Means, and Standard Deviations among Variables in Study

	Initial WRAT	Second WRAT	Final WRAT	Initial ABLE	Final ABLE	Initial Age	Final Age	FSIQ	Social Class	Psych. Exam.	Language	Neur. Exam	Neur. Hist.	Educ. Place.
Initial WRAT														
Second WRAT	.86**													
Final WRAT	.70**	.89**												
Initial ABLE	.77**	.90**	.82**											
Final ABLE	.63**	.77**	.82**	.78**										
Initial Age	.58**	.43**	.30*	.42**	.37**									
Final Age	.42**	.44**	.35*	.40**	.40**	1.00**								
FSIQ	.20	.30*	.30*	.40**	.40**	-.004	-.03							
Social Class	-.33*	-.34*	-.23	-.26	-.22	-. 02	-.12	-.01						
Psych. Exam	.12	.14	.22	.20	.12	. 12	.15	.13	.20					
Language	-.03	-.16	-.17	-.14	-.12	. 39*	.31*	-.16	.14	-.001				
Neur. Exam	.21	-.02	-.08	-.001	-.14	-.004	-.05	-.04	-.12	-.03	-.03			
Neur. Hist.	.07	.09	.12	.15	.03	-.06	-.10	.10	.11	-.06	.007	.16		
Educ. Placement	-.29	-.36*	-.36*	-.33*	-.44**	-.19	-.19	-.36*	-.17	-.07	-. 03	.11	.11	
Mean	1.9	3.3	3.8	2.9	4.3	115	183	88	4.2	1.5	1.3	1.5	1.5	2.9
Stand. Dev.	1.1	1.4	1.7	2.3	2.6	22	25	10	.67	.73	.68	.73	.59	1.1

* $p < .05$

** $p < .01$

Table 4

Step-Wise Regression of Sample Characteristics on Final WRAT

Source	df/res.	F	% Variance Accounted for	Standard Beta
Neur. Exam	1/38	.26	0.6	-.09
Language	2/37	1.19	3.1	-.22
Psych. Exam	3/36	1.85	4.7	.20
Social Class	4/35	3.13	7.5	-.29
FS IQ	5/34	2.59	5.9	.09
Intiial Age	6/33	5.41*	10.9	-.04
Educ. Placement	7/32	3.71*	6.9	-.33
Age at Testing	8/31	.31	0.5	.36
Neur. Hist.	9/30	3.09*	5.5	.24

* $p < .05$

Standardized Regression Equation:

Final WRAT = -.04 Initial Age -.33 Educ. Placement + .24 Neur. Hist.